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Dredge Net Fishing for Sea Urchins (449)

Resource situation

While Strongylocentrotus intermedius are distributed in the reef zone throughout the coast of Hokkaido, Kita* Anthocidaris crassispina are confined to the Pacific coast from the Japan Sea coast through Tsugaru Strait and to the west of Cape Erimo.

The output volume of Strongylocentrotus intermedius on the Japan Sea coast peaked in 1972 - 73 and rapidly declined in 1974, but thereafter it has been slowly increasing. However, the habitation density in various places is low, and overall it is at a low level. Kita Anthocidaris crassispina, contrary to Strongylocentrotus intermedius, show a tendency to increase the further south the fishing grounds are, but because the yearly fluctuation in growth volume is great, the resource situation is unstable in many places.

From Tsugaru Strait to Funka Bay the growth of both Strongylocentrotus intermedius and Kita Anthocidaris crassispina is good, but the output volume per km of coastline is not very good. Recently the output volume of Kita Anthocidaris crassispina has been in a declining trend.

Along the Hidaka and Tokachi coasts the habitation density of Strongylocentrotus intermedius is high and the resource volume also seems to be abundant, but the yearly fluctuation is not clear.

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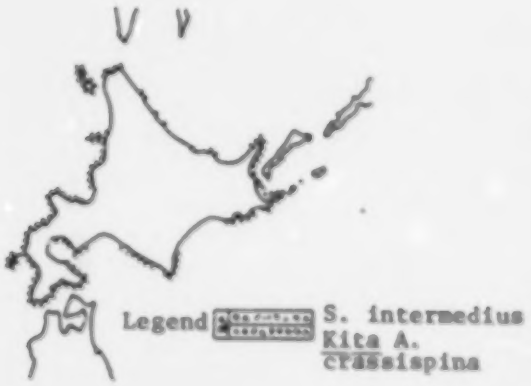
* Translator's note: Underlined word denotes transliteration for which no English translation found

Along the eastern Pacific coast from Kushiro to Habomai, diving fishing is carried out, and the catch rate is high so that the resource is in a dwindling trend.

In the Rausu region, resource management is being practised in a thorough manner, but the yearly fluctuation in growth rate is great, so that the resource fluctuation is also large.

The habitation density of Strongylocentrotus intermedius on the Okhotsk coast is relatively high, but the growth and fleshiness are poor in many places, and the fishery target resources have become fairly low compared to the distributed volume.



1. Species, fishing method and municipality

(1) Species: Strongylocentrotus intermedius

(2) Fishing method: Dredge netting for sea urchins

(3) Location: Nemuro City; Betsukai Town; Shibetsu Town

2. Development of fishing implement and fishing method

This fishing implement and fishing method were originally used for scallop dredge netting and modified for sea urchin fishing. On this water front, from around 1966, in addition to a rise in demand for shucked sea urchins, the scallop resource in these waters started diminishing and sea urchins were being noticeably

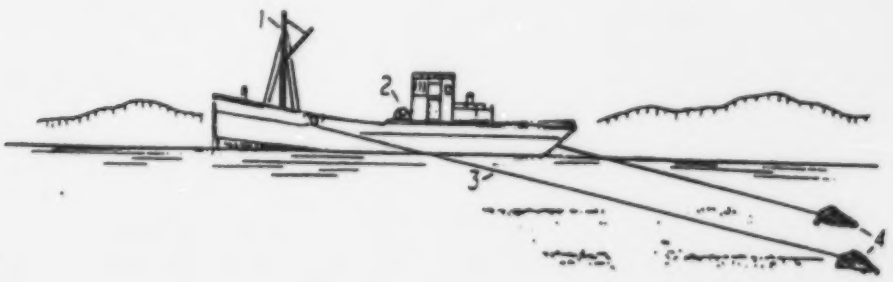
caught mixed in with the scallops, so that choosing sites with more sea urchins than scallops, this fishery was begun and has continued to the present.

3. Characteristics of fishing grounds

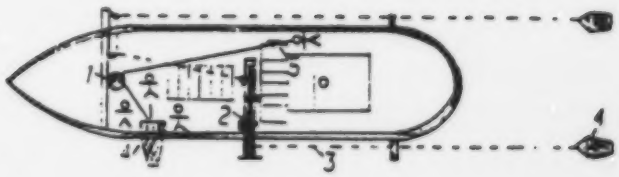
The fishing grounds in general are widely in gravelly areas, but here and there small stones and pebbles are mixed in, with seaweeds flourishing. Also, places where driftweed stagnate on the sea surface can be seen in various spots, which make good fishing grounds for sea urchins. The water depth of the fishing grounds at 10 - 15 m is relatively deep, and the current at 3 - 4 knots is fast, while the transparency at 2 - 3 m is low as well, making the conditions unsuitable for spoon netting.

4. Operating method (450)

(1) Diagram of operation



(2) Crew position diagram



(3) Size of fishing boat

5 - 10 t; 50 - 70 PS

(4) Operating method and knack

Because sea urchins in waters where seaweeds flourish are fleshier and more abundant, fishing in this sort of area is an operating requirement. The operating method is the same as general dredge netting, whereby the dredge net is cast against the current. The length of the tow line wire that prevents overturning of the net is adjusted according to the speed of the current and change in water depth and such, but generally a length of 3 - 4 times the water depth is used and the tow line speed is set at slow speed, towing for approximately 40 - 50 minutes or thereabouts before hauling up the net.

Because this fishery is done in commonly-owned waters, the cooperative concerned has laid down the number of operating vessels, operating zones, season, and usable boat, fishing implement and catch regulations, in addition to which agreements have been made on resource protection (transplantation and mixed catch ban), hull painting, flag-flying, etc.

(5) Number of fishing implements

Dredge nets: 3 (of which 1 is reserve)

Winches: 1 set

(6) Operating season

Spring: March - May

(Season closed July - October as spawning season)

Autumn: October - December

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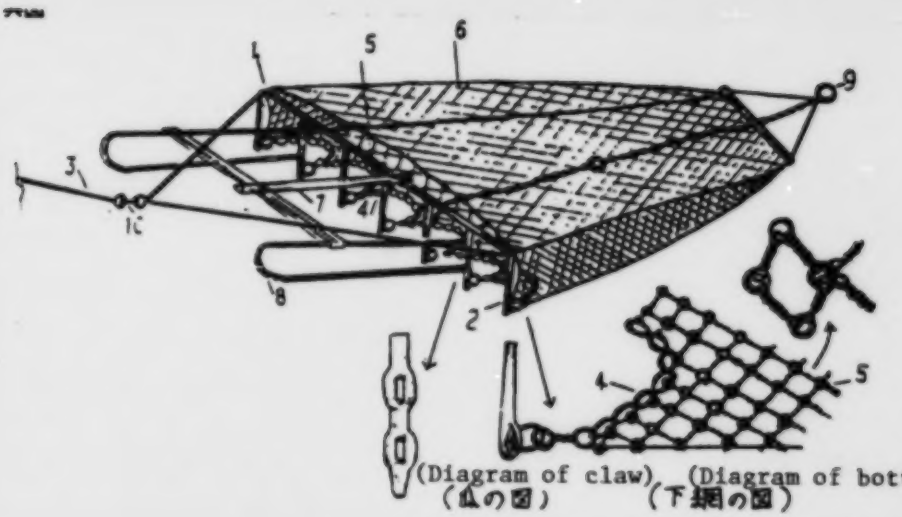
5. Fishing implement structure (451)

(1) Diagram of fishing implement



(Diagram of claw) (Diagram of bottom net)
(爪の図) (下網の図)

Table 1. Breakdown of dredge net materials

Label	Name	Material	Required quantity
1	Dredge (iron)	Iron rod 2 m in length and 7 cm in outer diameter	3 (for 3 units)
2	Dredge claw (iron)	Length 45 cm	21 (7 per unit)
3	Tow line (wire)	Diameter 9 mm (1 ball)	200 m
4	Chain	Diameter 15 mm	2.5 m
5	Bottom net (wire net)	Net segment #12 Ring segment #10	50 kg (1 loop)
6	Top net (twine net)	10 g Haikure twine	4 kg
7	Winch bar	Japanese oak material 1.2m x 15cm x 10 cm	3 pieces
8	(Skid)	Iron material 3m x 3 cm (diam.)	6 pieces
9	Tightening ring	Chain 7mm iron ring 15mm x 20cm	3m x 2 pieces
10	Twist preventer	15 mm	2 pieces
11	Angle bar (connector)	Iron material 3 cm in diameter	1.5 m

The frame and claws of the dredge are made at an iron foundary. The wire net and twine net are not available on the market so are hand made. Including making this and the assembly of one set of accessory equipment, about 20 persons are required.

(2) Explanation of set-up and its knack

This fishing implement is restricted to 7 claws in order to avoid the mixed catch of scallops and sea squirts, etc., and on the tip of the claw is attached a 3 cm ring to prevent the claw from going deep into the seabed. By making the chain heavy, the seabed is dredged.

A breakdown of the implement materials is given in the table above.

(3) Explanation of accessory equipment

(a) Winch drum and pump

Adjusting the length of the tow line according to the water depth and such, the dredge net is hoisted onto the deck and the catch removed.

(b) Shovels and baskets

For use in sorting out the catch, 3 - 4 shovels and 30 - 50 baskets are readied.

6. Reference data (452)

(1) Number of operating vessels by municipality (as of 1978)

	Habomai Fishery Cooperative	- 1 vessel	
Nemuro City:	Nemuro Fishery Cooperative	- 4 vessels	Total 7 vessels
	Wannaka Fishery Cooperative	- 2 vessels	
		5 - 10 tons; 50 - 70 PS	
Shibetsu Town:	Shibetsu Fishery Cooperative	- 7 vessels	
		3 - 5 tons; 30 - 40 PS	
	Nozuke Fishery Cooperative	- 3 vessels	
Betsukai Town:			Total 13 vessels
	Betsukai Fishery Cooperative	- 10 vessels	
		5 - 10 tons; 50 - 70 PS	

(2) Average catch per vessel

22 tons (shell-on weight, yield 14.8%) 325.6 kg

(3) Degree of dependence on this fishery

27% - 55%; average 41%

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(4) Regions where this fishery is engaged in

Nemuro City; Betsukai Town; Shibetsu Town; part of jurisdiction of Abashiri Prefectural Branch Office (Lake Saroma, Lake Notoro).

(Nemuro Northern Regional Fisheries Technology Dissemination Advisory Office)

Spoon Net Fishing for Sea Urchins (453)

1. Species, fishing method and municipality

(1) Species: Kita Anthocidaris crassispina (Nona)

(2) Fishing method: Spoon netting

(3) Location: Okushiri Town

2. Development of fishing implement and fishing method

Ever since the opening of the islands, sea urchins had been collected using spoon nets, and crushing them together with their shells, they were scattered into the sea to draw fish together for fishing.

Since young sea urchins began to be shipped out from around 1968, the large-sized sea urchins have been used at home, just making salted sea urchins.

This fishery is done in many cases as a side business to abalone, Undaria pinnatifida, octopus, cod and squid fishing, and is occupied for the most part by shallow-sea fishermen.

3. Characteristics of fishing grounds

The fishing grounds are reefy, cobbled, basin areas, with operations being done at water depths in the 1 - 10 m range, but most of the catch occurs at 4 - 7 m or so.

4. Operating method

(1) Diagram of operation

(2) Crew position diagram (one-man crew)

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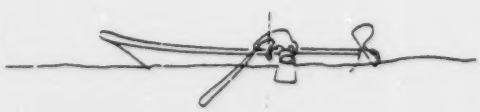
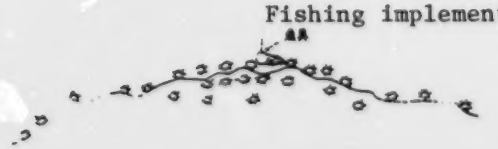


Fishing implement



(3) Size of fishing boat

Outboard motor mounted beachboat: 0.4 ton; 25 PS

(4) Operating method and knack

When the sea is clear and calm a flag signal goes up and operation gets under way. Upon reaching the fishing grounds, a peering glass is held by the mouth, and stroking the oar with the feet to navigate, the sea urchins are looked for.

Using a spoon net suited to the water depth, whenever the spoon net gets about half full, it is hauled aboard and the sea urchins removed, and then the spoon net is dropped back into the sea again to repeat the operation. (When the wind or waves start up, an anchor of approximately 4 kg is used.)

Young sea urchins are taken back to port to fit in with the ferry boat schedule, while the large-sized sea urchins are taken in after completing an hour's operation, doing the sorting on the beach front. Young sea urchins for shipment are shipped out packed 150 to a box, while the large-sized sea urchins are salted for home use.

(5) Number of fishing implements

As the fishing implements, three spoon nets differentiated in length by water depth (3 m, 5 m, 8 m) are readied. The mouth of the spoon net is made about 25 cm.

(6) Operating season

For young sea urchins it is primarily June, going out to fish at the crack of dawn and shipping them out timed with the ferry boat's departure (there is a quantity limit).

Large-sized sea urchins are collected in July for a total of five days one hour a day.

(The collection of sea urchins has traditionally been conducted after abalone collection.)

5. Fishing implement structure

(1) Diagram of fishing implement

(2) Preparation: Made by oneself. (454)

Metal work: ϕ 6 mm brass or ϕ 9 mm iron rod used

Net: Normally 2.4 cm mesh used

6. Reference data

(1) Number of operating vessels: 441 vessels

(2) Average catch per vessel: 253 kg

(3) Degree of dependence on this fishery: 55%

(4) Region where this fishing method is being practised: Okushiri Town

(Okushiri Regional Fisheries Technology Dissemination Advisory Office)

Spoon Net Fishing for Sea Urchins (455)

1. Species, fishing method and municipality

(1) Species: Kita Anthocidaris crassispina

(In dialect, Nona, black sea urchin)

Strongylocentrotus intermedius

(In dialect, Gaze, red sea urchin)

(2) Fishing method: Spoon netting for sea urchins

(3) Location: Toyoura Town; Abuta Town; Date City

2. Characteristics of fishing grounds

Both Nona and Gaze inhabit reefy or pebbly locations. Reefs abound in crevices, and they favour very hard rock material. Gaze is a coastal and low-salt species, while Nona is an offshore and annual-salt species.

Sea urchins feed on seaweeds, particularly Undaria pinnatifida, kelp, Eckloris bicyclis, gulfweed, agar-agar, laver, Sugamo and such, and good fishing grounds are formed where these flourish. Also, as the water depth gets deeper, the development of the gonads becomes poorer and their colour also gets poorer, so the value as a fishing ground diminishes.

Sea urchins are slow moving. To crawl along the slope of a rock they use tube feet. Firmly grasping bits of shell, pebble and seaweed with their tube feet, they attach them to their body. This habit is thought to protect them from predators or strong light.

Because sea urchins are apheliotropic, they hide in the shade of rocks or in crevices during the day but move vigorously looking for food when it becomes night, becoming most active around dawn.

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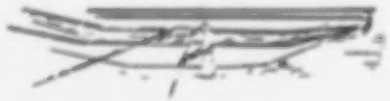
3. Operating method

(1) Diagram of operation and crew position diagram



(2) Size of fishing boat

0.3 - 0.5 t (beachboat)

Outboard motor: 10 PS

Crew: 1 person

(3) Operating method and knack

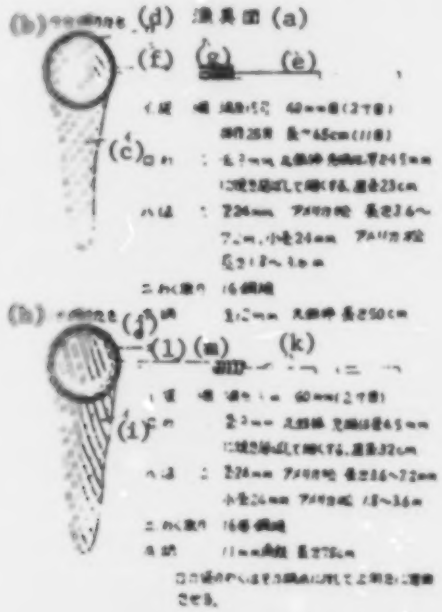
One small and one large fishing implement are readied. In places where the seabed is fairly flat a large-sized spoon net is used, while in places like narrow channels and holes the sea urchins are scooped up with a small-sized spoon net.

Searching the seabed early in the morning using a peering glass in a beachboat, the sea urchins are scooped into the spoon net as they are spotted, and when the bag net becomes heavy it is hauled aboard the boat. While there is no special knack to speak of, when the season opens fishing is started from the shallow easier-to-fish locations and gradually shifted to the deeper spots.

(4) Number of fishing implements

Large-sized spoon net: 1 (for Nona)

Small-sized spoon net: 1 (for Gaze)



(a) Diagram of fishing implement
(b) Gaze fishing spoon net
(c) Bag net: No. 15 cotton twine, 60 mm mesh (2 Japanese inch mesh), weight 25 me (1 me = 3.759 g), length 65 cm (11 meshes)
(d) Rim: 9 mm diameter iron rod, the leading edge of which is heat-stretched and thinned down to a thickness of 4.5 mm. Diameter 23 cm.
(e) Halberd: 24 mm diameter Douglas fir 3.6 - 7.2 m long. Small 24 mm diameter Douglas fir 1.8 - 3.6 m long.
(f) Rim take-up: No. 16 copper wire
(g) Handle: 12 mm diameter iron rod 50 cm long
(h) Nona fishing spoon net
(i) Bag net: No. 15 cotton twine, 60 mm mesh (2 Japanese inch mesh)
(j) Rim: 9 mm diameter iron rod, the leading edge of which is heat-stretched and thinned down to a diameter of 4.5 mm. Diameter 32 cm.
(k) Halberd: 24 mm diameter Douglas fir 3.6 - 7.2 m long. Small 24 mm diameter Douglas fir 1.8 - 3.6 m long.
(l) Rim take-up: No. 16 copper wire
(m) Handle: 11 mm angle iron 75 cm long

The rim of the bag is bent upwards relative to its handle.

(5) Operating season

July - September

4. Reference data (456)

(1) Number of operating vessels by municipality

Toyoura Town: 76 vessels

Abuta Town: 20 vessels

Date City: 120 vessels

(2) Average catch per vessel

Average of 5 - 10 kg or so per day.

(Muroran Regional Fisheries Technology Dissemination Advisory Office)

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Basket Fishing for Sea Urchins (457)

1. Species, fishing method and municipality

(1) Species: Strongylocentrotus intermedius (Ganze, Gaze in dialect)

Kita Anthocidaris crassispina (Nona in dialect)

(2) Fishing method: Basket fishing for sea urchins

(3) Location: Rumoi City

2. Development of fishing implement and fishing method

In this region, from of old a propagation method has been carried out whereby poorly fleshed sea urchins in the deep are transplanted to shallow fishing grounds and fattened for harvesting. Learning about the good collecting efficiency of a basket implement being used in the Oma region of Aomori Prefecture, it was introduced by Mr. Koichi HAMATANI of Sandomari Town around 1971.

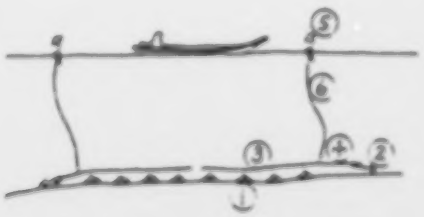
The catch efficiency of this implement being good, it is used only at the time of propagation work involving the aforementioned transplantation from deep to shallow water, and for general sea urchin fishing the erstwhile halberd implement is used.

3. Characteristics of fishing grounds

Places where the water depth is 7 - 10 m and the seabed is flat with few seaweeds are good fishing grounds, and operations can now be carried out to depths that the halberd implement cannot reach.

4. Operating method

(1) Diagram of operation



(2) Crew position diagram: As above

(3) Size of fishing boat

One-man outboard motor (7 PS) mounted beachboat (0.3 ton)

(4) Operating method and knack

Being a simple operation, there is no particular knack to speak of.

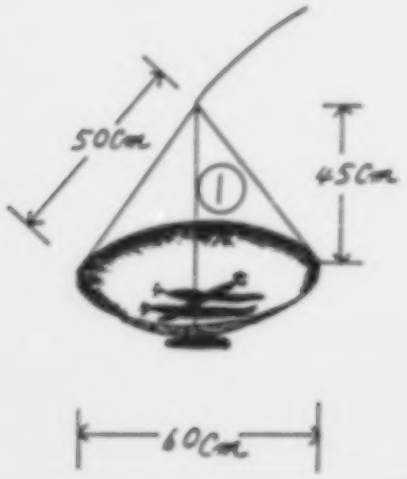
Being a short-time operation in the morning or evening, it can be engaged in as a side business with other fishery. Hauling up the baskets and collecting the sea urchins, the operation is completed by replenishing the seaweed bait, and the sea urchins are released into designated waters.

(5) Number of fishing implements: 25 baskets per string

(6) Operating season: Mid-August

5. Fishing implement structure

(1) Diagram of fishing implement



(2) Required materials (458)

Label	Name	Material	Required quantity
①	Basket	Ringutakiron No. 6 (6 mm) Netting Haizekkusu No. 8 8 strand Lead weight 187 g each	25 baskets (Purchased custom-made from manufacturer)
②	Anchor	Sea anchor 4 kg	2
③	Trunk rope	Haikure twine 20 g	100 m
④	Sinker rope	Haikure twine 20 g	20 m
⑤	Bonden		2
⑥	Bonden rope	Haikure twine 20 g	30 m
⑦	Bait	Raw kelp	

6. Reference data

(1) Number of operating vessels by municipality

Rumoi City: 30 outboard motor mounted beachboats

0.3 ton; 7 - 10 PS

(2) Average catch per vessel

10,000

(Rumoi Southern Regional Fisheries Technology Dissemination Advisory Office)

Forcep Fishing for Sea Urchins (459)

1. Species, fishing method and municipality

(1) Species: Kita Anthocidaris crassispina (Nona in dialect)

Strongylocentrotus intermedius (Gaze in dialect)

(2) Fishing method: Forcep fishing

(3) Location: Kikonai Town

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2. Fishing grounds

Fishing ground environment

Kikonai Town has a flat beach area which extends approximately 100 m offshore along the coast line, beyond which it becomes reefy.

3. Operating method

This entails beach fishing using an unpowered boat.

(1) Size of fishing boat

Unpowered boat (beachboat): 0.5 ton

Recently for commuting to and from the fishing grounds an outboard motor has been mounted.

(2) Fishing season and regulations

The fishing season is June and July, and in accordance with fishery control regulations, shell length limits of 4 cm for Strongylocentrotus intermedius and 5 cm for Kita Anthocidaris crassispina respectively are enforced.

4. Fishing implement structure

(1) Halberd

A halberd was originally the name of a weapon where a long handle was attached to a double-edged ironware. The halberd of a fishing implement is a type of spearing implement. In Hokkaido the handle of a spearing implement is called a "halberd" in many cases.

The "halberd" is generally made of Shuri cherry (a species of the cherry sub-family, commonly called Shuri), which is finished to a roundness of 3.5 cm in diameter and a length of 33 cm or so.

In the case of operating at depths, an extension pole is added and used. There are two ways to make this connection: one is to slice off diagonally approximately 20 cm from each end and bind them tightly together by spin-winding, while the other is to join them by fitting the ends into a galvanized iron pipe of approximately 30 cm without slicing the ends off.

(2) Forcep

In the olden days a spear or hook used to be used, but a spear would damage the shell while a hook would injure the internal organs in many cases, so they have been banned as implements unfit for cultivation.

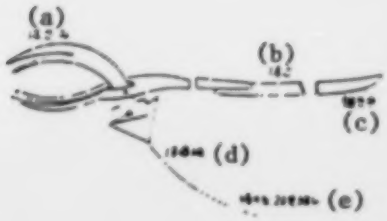
Forceps come in four sizes consisting of extra large, large, medium and small, their use depending on the water depth. Normally a large and small size are readied for use.

(3) Accessory equipment

(a) Peering glass

(b) Bottom opener, a bag net suspended into the water from the boat to put the catch in.

(4) Diagram of fishing implement structure



(a) Forcep
(b) Halberd
(c) Extension pole
(d) No. 18 wire
(e) Reeled twine No. 20 cotton twine

Type	Length	Weight	
Extra large	77 cm	1500 g	Used in 6 - 8 m depths
Large	69	1200	" 5 - 6 m "
Medium	53	950	" 4 - 5 m "
Small	40	750	" 3 - 4 m "

(Oshima Central Regional Fisheries Technology Dissemination Advisory Office)

Entanglement Fishing for Sea Urchins (460)

1. Species, fishing method and municipality

(1) Species: Strongylocentrotus intermedius

(2) Fishing method: Entanglement fishing

(3) Location: Mitsuishi Town

2. Development of fishing implement and fishing method

The catching of sea urchins in this region had from long ago been by hand or spoon netting, but as a result of several members of the cooperative's sea urchin panel having inspected the fishing implements and fishing methods of various places in 1974, the introduction of this fishing method was the start of it. In addition to the catch efficiency being extremely high, there is the advantage that the making of the fishing implement is easy, but there is the drawback that the twine of the fishing implement sticks to the sea urchin and the twine gets mixed into the flesh when shucking, which reduces the product value, and also that poorly fleshed sea urchins get mixed in the catch as well, so after only a year this fishing method was discontinued and at present is not in use.

3. Characteristics of fishing grounds

The entire water front in this region consists of a flat beach and reefs, but here and there pebble (cobblestone) patches are scattered, with seaweeds (mainly kelp) growing as feed. These are the locations inhabited by sea urchins that make good fishing grounds. Reefs have many shady areas and crevices, and the sea urchins are often seen in these places. The water depth is 1 m - 5 m, characterized by low transparency.

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4. Operating method

(1) Diagram of operation

(2) Crew position diagram

(3) Size of fishing boat: Tonnage: 1 ton; FRP output: 20 PS; number of crew: 1

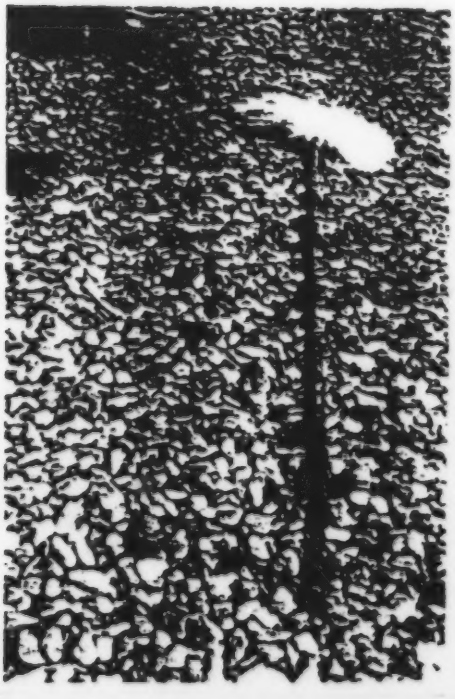
(4) Operating method and knack

Putting the boat near a reef where the sea urchins live and stick to, the rod (Dasukin) is placed directly on the rock field and worked. Entangling and fastening the sea urchins with the Dasukin and hauling them aboard, the method is simple. The catch in abundant places may be as high as 30 at a time, making the efficiency more than three times that of spoon netting.

(5) Number of fishing implements: Dasukin 1 - 2

(6) Operating season: Early May - early July

5. Fishing implement structure



Diving for Sea Urchins (461)

1. Species, fishing method and municipality

(1) Species: Strongylocentrotus intermedius (sea urchin, Ganze)

(2) Fishing method: Diving for sea urchins

(3) Location: Nemuro City; Habomai

2. Development of fishing implement and fishing method

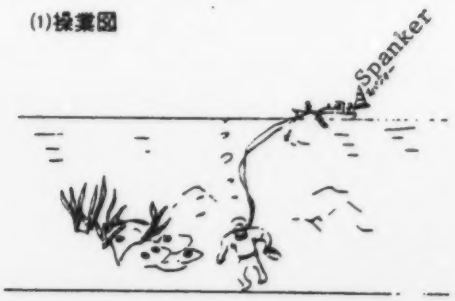
Until about 1962 the sea urchin fishery in the Habomai region was not of a commercial scale. Since the output had been raised by this fishing method in the Atsukeshi region, this method was introduced in 1963 and has continued to the present.

3. Characteristics of fishing grounds

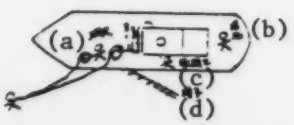
The places where kelp is growing in pebble and reef areas are good fishing grounds. Also, places where a rope boat has sunk form good fishing grounds as well.

4. Operating method

(1) Diagram of operation



(2) Crew position diagram



(a) Rope hand
(b) (Illegible)
(c) Engineer
(d) Ladder

(3) Size of fishing boat

Up to 5 tons; 50 PS; 4-man crew

(4) Operating method and knack

The fishing grounds are on the Pacific side from Cape Nosappu to Tomoshiri, with operations at depths from 5 m, which is the boundary with spoon netting of sea urchins (the 5 m depth line being used as the demarcation) to around 10 m. The operating vessels are all crewed by four people (skipper, engineer-cum-handy man, rope hand and diver) in pairs, jointly by two fishing families. Designating three vessels as lead boats from among all the operating vessels, the boats leave port at 6:00 in the morning and return to port at 4:00 p.m. During operation, the boats cast anchor and drift, the engine is stopped running and the air compressor is actuated. The rope hand maintains contact by cordless telephone with the diver, lays out the air hose and regulates the air tank, etc. The diver, apart from lunch time, takes three breaks (about 10 minutes each time) during the operation. The collected sea urchins are hauled up by the rope hand and engineer. The role of a lead boat is to decide for or against fishing that day, cope with accidents, enforce operating regulations and such. The quantity of sea urchins to be collected by the end of fishing is set at 25 tons with shell per vessel and a maximum of 7 baskets per day (70 kg a basket). The catch is weighed in the presence of both a fisheries cooperative supervisor and panel member, and the catch is shucked by each family, packed into a box (130 packed in) and shipped out. After completion of fishing, the submission of an operating journal has been made mandatory.

(5) Number of fishing implements

Net bags: 7 - 5

(6) Operating season

October 1 - January 31

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